

## Estimation of the agricultural profitability of rural enterprises in the Mixteca region of Oaxaca

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### Abstract

In the Mixteca region of Oaxaca, rural poverty predominates, and the common economic activity is agriculture; however, the agricultural sector is precarious and has not reduced poverty. There are small plots, low value-added traditional products, old-technology techniques and there is no investment in capital. In this sense, it is necessary to know the economic benefits generated by the production units (PUs), visualizing them as rural enterprises. The objective of the research was to make an approximation to the estimation of the profitability of the agricultural production of the rural enterprises in the Mixteca region of Oaxaca for 2007 and to know what the main factors that influenced this profitability were, for this, the income and costs of the rural enterprises by municipality were estimated, their difference yielded the profitability value, and the factors that influence it were determined by means of ordinary least squares. The results indicated that profitability by rural enterprises was in the range from \$-19 000 to \$13 000, by municipalities from \$-4 million to \$4 million and by area, from \$-9 000 to \$6 500 per hectare. The production, improved seeds and size of PUs positively influenced the profitability value, while self-consumption, lack of infrastructure, communal property and income derived from government support decrease it. Finally, it is necessary to promote the association of producers that allows increasing production and increasing selling practices to generate greater benefits derived from agriculture.

**Keywords:** agriculture, production units, profits, self-consumption.

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## Introduction

The rural sector has been, for several decades, the social and productive sector with the greatest conditions of backwardness and vulnerability in the country. According to CONEVAL (2019), at the national level, 41.9% of the population is in a situation of poverty (equivalent to 52 million people) and 7.4% is in extreme poverty (9 million people), most of the poverty is located in the southeastern states, being Chiapas with 76% of its population in poverty the state with the highest percentage, followed by Guerrero with 66.5% and Oaxaca with 66.4%; that is, in general, poverty is located in the states that have the highest percentage of rural population, they present marginalization, lack of public investment and lack of access to markets (Ortiz and Ríos, 2013). Particularly, Oaxaca is the state where 70% of its localities have less than 2 500 inhabitants and ranks last in the state competitiveness indices according to the Government of the State of Oaxaca (2016), this situation influences the high indices of marginalization and poverty characteristic of the state.

Within the state, the Mixteca region, located in the northwest of the state, is home to 11.8% of the state population, 77.4% are rural communities and 73% of the population is in a situation of poverty, only 35% of the population is economically active, with services being the largest employment (35%), followed by agricultural activities (26%) and 32% of income is up to 1 minimum wage (Universidad Tecnológica de la Mixteca, 2017).

Given that three quarters of the Mixteca population is rural and agricultural activity continues to be the source of income for a significant number of people, it is important to know their agricultural economy, but to analyze it with a business vision, since agricultural PUs are also enterprises in the sense that farmers produce goods (mainly food products) from which they seek to obtain a positive profitability, they have technology, organization and generate jobs (Parra, 2000).

According to Mallo *et al.* (2000), production integrates technical and economic elements, technically, it involves the transformation of some goods into others, which, in the case of the agricultural sector, involves a biological process and economically this process implies a value higher than that of the means used in obtaining it. Agricultural production is carried out in the so-called PUs and depends on factors such as land area, labor employed, capital invested and value of annual profits (Molina de Paredes, 2017).

The objective of this research was to approximate the estimation of the profitability of agricultural production in the UPs (rural enterprises) in the Mixteca region of Oaxaca for 2007 and to know what the main factors that influenced this profitability were, in order to establish a baseline for further research and make recommendations for the benefit of the agricultural economy of the region. This study will also allow finding useful parameters for a next stage of research.

The hypothesis raised considering similar studies (Espinosa *et al.*, 2013) is that rural enterprises in the Mixteca region of Oaxaca, in 2007, had average returns of less than \$15 000 pesos per year and in some cases negative returns, the factors that significantly influenced were labor, fertilization and the area harvested (Molina de Paredes, 2017).

## Materials and methods

The research consisted of making a quantitative approximation to the estimation of the monetary profitability of rural enterprises in the Mixteca region of Oaxaca for 2007, a year chosen because the main data at the municipal level necessary for the study are only in the National Agricultural, Livestock and Forestry Census 2007, the most recent agricultural census conducted in Mexico, which, due to the level of analysis, is not replaced by the recent National Agricultural Survey 2017 (Centro de Estudios para el Desarrollo Rural Sustentable y la Soberanía Alimentaria, 2019).

The information was obtained from official databases published by institutions such as the National Institute of Statistics and Geography (INEGI, for its acronym in Spanish), the National Agricultural, Livestock and Forestry Census 2007 (CNAGF, for its acronym in Spanish), the Agrifood and Fisheries Information Service (SIAP, for its acronym in Spanish), the National Council for the Evaluation of Social Development Policy (CONEVAL, for its acronym in Spanish) and the National Institute of Forestry, Agricultural and Livestock Research (INIFAP, for its acronym in Spanish). The universe of study was the rural municipalities of the Mixteca region of Oaxaca, considering the number of PUs existing in each municipality.

The number of rural municipalities were 151 of a totals of 155 municipalities, the criterion used to determine rural populations was based on Unikel *et al.* (1976), who proposes that a rural population has less than 15 000 inhabitants-. For the 151 rural municipalities of the Mixteca region, data for 2007 were obtained on the following variables: 1) Social variables: population, level of schooling and poverty levels; 2) economic variables: economically active population, paid and unpaid labor, value of production, economic activities, family income and production costs; and 3) productive variables: number of production units, agricultural area, irrigated and rainfed area, use of machinery, use of fertilizers, use of improved seeds, self-consumption, selling, and production volume. The reference for the information on production costs was the Agricultural Technical Agenda of Oaxaca (2015), published by SAGARPA, SENASICA and INIFAP.

### Profitability estimation

For the determination of profitability, it was based on Ayala *et al.* (2013). Where: profitability = total income – total costs. Given the limited availability of cost data (the census does not provide information on specific production costs for each PU or for each municipality), the calculation of income and costs was made with the design of the following procedure: Where: IDAM= income from agriculture in the municipality (pesos); *i*: crop (coffee, beans, corn, wheat); *S*= cultivated area in the municipality (ha); *R*= yield (t ha<sup>-1</sup>); *P*= price (pesos); IDEA= income of the agricultural enterprise (pesos); *E*= number of enterprises in the municipality; IDAH= average income from agriculture per hectare (pesos).

$$\text{Income: IDAM} = \sum_{i=1}^4 S_i R_i P_i; \text{IDEA} = \frac{\text{IDAM}}{E}; \text{IDAH} = \frac{\text{IDAM}}{S}$$

Costs:

$$\text{CADAM} = \text{TATAM} * W * t + \sum_{i=1}^4 (S_i C F H_i \% F S_i \text{pro} F H_i + S_i C M H_i \% M S_i \text{pro} M H_i + S_i C S H_i \% S S_i \text{pro} S H_i)$$

$$; \text{CADEA} = \frac{\text{CADAM}}{E}; \text{CADAH} = \frac{\text{CADAM}}{S}$$

Where:

CADAM: aggregate cost of agriculture in the municipality (pesos)	TATAM: total agricultural labor accumulated in the municipality	W: wage
t: days worked	CFH: cost of fertilizer per hectare (pesos)	%FS: percentage of the fertilized area
proFH: proportion of fertilizer used to that recommended per hectare	CMH: cost of the use of machinery per hectare (pesos)	%MS: percentage of the area that uses machinery
proMH: proportion of the use of machinery to that recommended per hectare	CSH: cost of improved seed per hectare (pesos)	%SS: percentage of the area that uses improved seed
proSH: proportion of the use of improved seed compared to that recommended per hectare.	CADEA: aggregate cost of the agricultural enterprise (pesos)	CADAH: aggregate cost of agriculture per hectare (pesos)

Profitability:(profit)  $GADAM=IDAM-CADAM$ ;  $GADEA=IDEA-CADEA$ ;  
 $GADAH= IDAH-CADAH$ .

Where: GADAM: profit from agriculture in the municipality (pesos); CADEA: profit from agriculture of the agricultural enterprise (pesos); CADAH: profit from agriculture per hectare (pesos).

### Factors influencing profitability

The relationship between the various social, economic and productive variables studied (explanatory variables) with the level of profitability obtained from the PUs of the municipalities (dependent variable) previously calculated was analyzed by means of the multiple linear regression model and OLS, where an equation of the type  $Y=\beta_0+\beta_1x_1+\beta_nx_n+e$  was obtained, the coefficients or parameters  $\beta_1, \beta_2, \beta_n$  denote the magnitude of the effect that the explanatory variables  $x_1, x_2, x_n$  have on the dependent variable (Enciso, 2014). Various models were estimated using different combinations of independent variables until obtaining the model that met the assumptions of the linear regression model related to multicollinearity, heteroscedasticity and autocorrelation, as well as an adequate goodness of fit with a confidence level of 95% in order to obtain parameters that could explain the effects between variables as close to reality as possible (Gujarati and Porter, 2010).

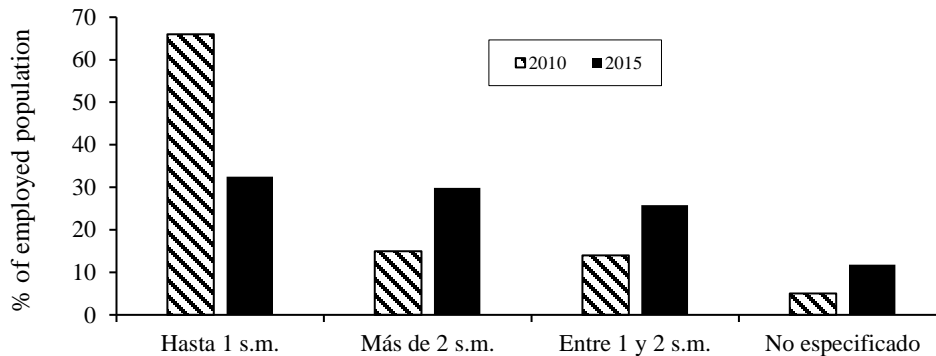
## Results and discussion

### Characteristics of the region

The Mixteca region in the state of Oaxaca is eminently rural, INEGI (2010) reports that 97% of the municipalities had less than 15 000 inhabitants, according to Gutiérrez and González (2001), rural populations are characterized by a high percentage of illiteracy, primary education as predominant

schooling, low availability of public services (public lighting, water, transport, drainage, health services), and agriculture predominates as an economic activity, characteristics of most localities of Oaxaca. In 2010, the employed population in the rural Mixteca was equivalent to 19% of the total population and more than half of it was engaged in the primary sector (55%), followed by secondary activities (20%), services (16%), trade (8%) and unspecified (1%) (INEGI, 2010). minimum wage (sm, salario mínimo in Spanish)

Income levels in the region have generally been low (Figure 1), the bulk of the employed population earns up to 1 minimum wage (sm, for salario mínimo in Spanish); however, there was an important change from 2010 to 2015, where the percentage of the population earning up to 1 sm decreased by half, increasing the number of people who earned more than 2 sm and between 1 and 2 sm (INEGI, 2015). This situation is related to the process of change in the main economic activities, where agricultural activity lost its leading role in the regional economy and where wage labor displaces agricultural activity, they are part of the great transformations that currently occur in the rural population (de Grammont, 2009).



**Figure 1. Income level in the Mixteca region (INEGI, 2010; 2015).**

Even though there has been a relative increase in income in recent years, poverty persists in the region, in 2010; 36% of the population suffered from food poverty, 50% from capability poverty and 70% from patrimony poverty according to the CONEVAL income poverty classification.

The study of Ramales *et al.* (2014), they support the information stating that, in 2008, 62% of the population of Oaxaca (2.2 million people) was in multidimensional poverty, in 2010 the percentage increased to 67% (2.5 million people), they also highlight that the Mixteca region ranks fourth in state poverty.

In addition to poverty, the population of the region has low levels of schooling, in 2010 more than half of the population over 15 years had only truncated primary education, by 2015 the percentage of the population with primary education decreased, increasing secondary education, but even so the bulk of the population remained in the average of 5.6 years of education.

On the other hand, the productive situation related to agriculture indicates that the state of Oaxaca contributes 1.5% to the national gross domestic product (GDP), of this 1.5%, 6% corresponds to agricultural GDP, the Mixteca contributes only 5% of the value of the agricultural production of the state. SIAP, for its part, reports data on the value of agricultural production at the level of Rural

Development Districts (RDD) from 2003 to 2019, analyzing the evolution of the value of production before and after the year of study, it was observed that the agricultural sector in the Mixteca has not presented important changes, ranking fourth with an annual growth rate of 4% over sixteen years, unlike of the central valley region of Oaxaca that showed the highest growth rate with 9% per year. If considered from the year of study (2007) to 2019, the annual growth rate in the Mixteca was 0.1%, it indicates that during this period it is likely that agricultural enterprises or PUs have not increased their profitability.

In the 151 rural municipalities of the Mixteca region, there are 69 960 PUs, which together cover 195 773 ha of the territory of the Mixteca (12.5% of the total territory). Eighty percent of PUs are engaged in agricultural or forestry activities with the use of 155 672 ha. The composition and characteristics of agricultural production units by rural municipality are precarious (Table 1).

**Table 1. Characteristics per PU of the Mixteca region of Oaxaca.**

	Mean	Median	Mode	Standard deviation	Rank	Minimum	Maximum
Area (ha)	2.7	2.4	-	1.5	14.9	0.82	15.7
Rainfed area (ha)	2.5	2.4	-	1.5	15.2	0.51	15.7
Irrigated area (ha)	0.16	0.04	0	0.24	1.2	0	1.2
Fertilized area (ha)	1	0.8	0	1.2	12.8	0	12.8
Area with improved seed (ha)	0.07	0.01	0	0.29	3.21	0	3.21
PUs with credit or insurance	12	4	0	28	192	0	192
Workers (number)	3	2.6	3.3	2.2	16.7	0.06	16.8
Unpaid workers	1.5	1.3	1	1.05	5.9	0.04	6
Paid workers	1.5	0.9	0	1.6	13	0	13

INEGI (2007).

On average, there are 350 PUs per municipality. Of the total of PUs, 96% are rainfed, a percentage higher than the state average reported by the Government of the State of Oaxaca (2016), equivalent to 93%, according to the government institution, this aspect indicates low level of technification in the agricultural process, especially in terms of water use, a situation that makes agriculture in the region highly vulnerable to weather events. It should be noted that most PU owners manage a small property, since, on average, each PU has 2.4 ha and employs 2.6 workers.

A total annual area of 112 574 ha was harvested in the region, which, on average, is equivalent to each rural enterprise harvesting 1.6 hectares, equivalent to 53% of the average area of each production unit. Rural enterprises in the region had a total production of 125 924 t of agricultural crops, which, on average, means that each rural enterprise produced 1.8 t in 2007, only 29% of the area was subjected to fertilization, on the other hand, only 8% of rural enterprises used irrigation systems, in addition, in the region there is one machine available for every 1 892 PUs. A total of 38 products were grown; however, four predominate in area, volume and value of production (Figures 2, 3 and 4).

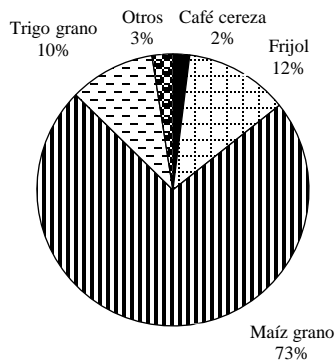


Figure 2. Area (ha) harvested per crop. SIAP (2007).

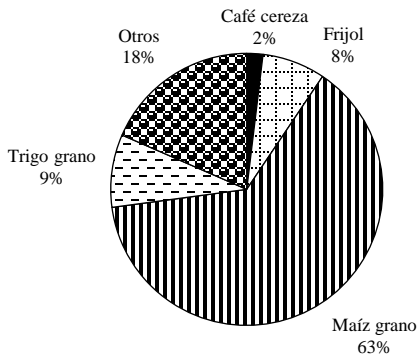


Figure 3. Volume (t) of production per crop.

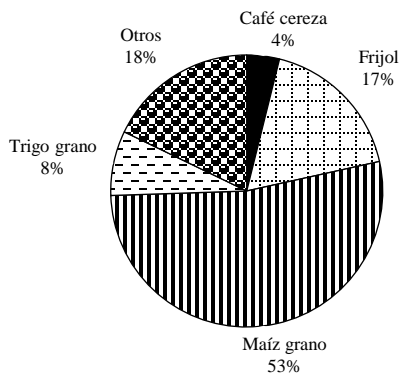


Figure 4. Value of production per crop. SIAP (2007).

Individual crop yields show that the crop that generates the highest productivity in the region is coffee ( $1.09 \text{ t ha}^{-1}$ ), followed by wheat ( $0.95 \text{ t ha}^{-1}$ ), corn ( $0.94 \text{ t ha}^{-1}$ ) and finally beans ( $0.55 \text{ t ha}^{-1}$ ). According to Bravo *et al.* (1992), in the Mixteca region, the yield of corn under adequate moisture and temperature conditions is  $1.18 \text{ t ha}^{-1}$ , the average obtained in this work is lower, although not by much ( $0.94 \text{ t ha}^{-1}$ ). The ideal wheat yield in the region indicated by Bravo is  $2 \text{ t ha}^{-1}$ , a value much higher than that reported in this research.

On the other hand, Ruiz and Loaeza (2004) reported bean yields of 0.28 t ha<sup>-1</sup> under the traditional method and 0.6 with technified method for the Central Valley region, the bean yield obtained in this research is close to the technified cultivation carried out in Central Valleys. According to INEGI (1997), the average yield of coffee cultivation in the state is 1.6 t ha<sup>-1</sup>, a value slightly higher than that reported here. Comparing with Montesillo (2016), who reports the national yield of rainfed corn of 2.2 t ha<sup>-1</sup>, the corn yield of the Mixteca is below by one tonne, and is at a great disadvantage with respect to the irrigated corn that Montesillo reports of 7.5 t ha<sup>-1</sup> and in the north of the country of 8 t ha<sup>-1</sup>, even the values obtained are lower than those reported for the southern part of the country 2.8 t ha<sup>-1</sup> for rainfed corn (CNDI, 2008).

Regarding agricultural labor, PUs of the region generate work for 175 277 people; however, 51% is unpaid work (on average, it represents 1.15 paid jobs and 1.30 unpaid jobs per PU). Because most municipalities in the region employ unpaid family labor, agriculture in the region is considered family-type. Yúñez *et al.* (2013) define family farming as that unit of agricultural or forestry production that uses more than 50% of family labor with respect to the total labor force it employs. In this sense, 61% of the municipalities studied practice family farming.

Due to the conditions of income poverty of the peasants, the production for self-consumption plays a fundamental role to ensure the food of the families, that is why the PUs that destine its production to the family consumption and livestock consumption predominate, which is a form of self-consumption (Table 2). The percentage of self-consumption (family consumption plus livestock consumption) is above the national average of rural economic units (73%) reported by Gómez (2016). The information coincides with the studies of Bolaños (1995), which indicate the predominance of subsistence production in the region, which causes the minimization of the contribution or value of the labor force (since it is unpaid labor).

**Table 2. Destination of the production of rural PUs in the Mixteca 2007.**

Destination of the production	Num. of PUs	Participation in the number of PUs (%)
Family consumption	47 893	70
Livestock consumption	7 606	11
Mercantile	12 605	19
Export	10	0.01

Database INEGI (2007).

The general characterization of the region indicates that rural enterprises are in a productive and economic context of low productivity and low investment, the small plot where production processes are carried out without the minimum mechanical technology necessary to increase production predominates, and practically no fertilizers are used, this generates that on average the production per rural enterprise is low, only 1.8 t in 2007, equivalent to producing approximately 150 kg per month or 735 kg per year per person.



## Profitability of rural agricultural enterprises

To obtain the profitability calculations, 144 municipalities were considered, removing seven due to inconsistency in their information reported in the census (zero workers). Using the cost information reported by SAGARPA, SENASICA and INIFAP (2015) for crops in the region, it was possible to obtain estimates of agricultural profitability by municipality, by rural enterprise and by area, considering a scenario of minimum use of inputs: Labor cost: \$77.00 per day (sm, in force in 2007).

The results show that the range of profitability in which PUs are ranges from \$-19 000 to \$13 000, with atypical cases (\$-24 733 and \$52 162). Under this scenario, only 44% of PUs generate positive but generally very low returns (Table 3).

**Table 3. Profitability of agricultural enterprises (pesos) by municipality (2007).**

Type of PU <sup>1</sup>	Municipalities	Profitability <sup>1</sup>
Consolidated <sup>1</sup>	5 (3%)	>\$36 150 < \$139 200
Transition <sup>1</sup>	5 (3%)	\$17 354 a \$36 150
Subsistence <sup>1</sup>	54 (38%)	\$0 a \$17 353
Low potential	80 (56%)	\$-1 a \$-24 733

<sup>1</sup>= categorization according to SAGARPA (2012).

SAGARPA (2012) made a categorization of family farming production units with productive potential considering their level of market integration and indicators of gross income or profitability, based on the particularities of this categorization: subsistence family farming (SFF), family farming in transition (FFT) and consolidated family farming (CFF), PUs of the Mixteca were characterized (Table 3). In sum, less than half of the PUs studied are considered to have productive potential (44%) of these, the highest percentage are considered SFF, which are oriented exclusively to self-consumption with insufficient income to guarantee an appropriate standard of living, resorting to other sources of income.

The PUs of FFT and CFF, which have the greatest potential to increase production and access markets, are located, in descending order, in the following municipalities: San Andrés Sinaxtla, Santiago Tillo, Santa María Chachoápam, San Juan Yucuita, San Juan Sayultepec, San Francisco Chindúa, San Miguel Tecmatlán, Santiago Noyoó, Santo Domingo Yodohino and Santo Domingo Yanhuitlán.

On the other hand, analyzing the profitability at the municipal level, the agricultural activity of more than half of the municipalities obtains negative returns (Table 4). Most of the municipalities are in the profitability range from minus four million pesos to four million pesos. There are municipalities that are considered atypical cases since their values are not within this range.

The seven municipalities where agriculture is most profitable correspond to Magdalena Jaltepec, Santa María Yucuhiti, Santiago Noyoó, Santa María Chachoápam, San Juan Sayultepec, San Andrés Sinaxtla and Santiago Tillo.

**Table 4. Profitability of municipal agriculture (pesos) (2007).**

	Municipalities	Profitability
Category I	7 (5%)	\$6 000 000 a 13 000 000
Category II	57 (39%)	\$1 a \$5 999 999
Category III	80 (56%)	\$0 a \$-37 000 000

At a smaller level, returns per area (ha) range from \$-9 000 per ha to \$6 500 per ha, with negative values of up to \$-20,000 per ha in atypical cases (Table 5).

**Table 5. Profitability of agriculture per hectare (pesos) (2007).**

	Municipalities	Profitability
Category I	14 (10%)	\$3 000 a \$7 000
Category II	50 (35%)	\$1 a \$2 999
Category III	80 (55%)	\$0 a \$-20 000

Profitability per hectare considers the four crops as a whole; however, due to the predominance in the value of production, these results mostly explain corn. Forty-five percent of municipalities have PUs that generate positive profits per unit area. The values obtained are within the parameters reported in other studies on rural production, for instance, Cruz (2018) found profits of \$2 012 ha<sup>-1</sup> for corn crops in the Sierra Sur de Oaxaca, Ixtla and Santiago (2015) reported negative average profitability for corn (\$-1 789) in the districts of Oaxaca.

In the case of the Mixteca, there is heterogeneity in returns between municipalities. The ten municipalities where the highest returns per hectare are located are the following: Santa María Chachoápam, San Juan Sayultepec, Santiago Tillo, Santa María Yucuhiti, San Miguel Tecomatlán, San Francisco Chindúa, San Juan Yucuita, Santiago Noyoó, San Andrés Sinaxtla, and Santo Domingo Yodohino.

### Factors influencing agricultural profitability

Using the methodology of OLS with correction for heteroscedasticity, various models were estimated and evaluated, which try to explain which the variables that significantly influence the profitability of rural enterprises in the Mixteca are, of the estimated models, the one that showed the greatest goodness of fit was selected, which presented significant coefficients for the independent variables at a confidence level of 95% with respect to the dependent variable, which did not show collinearity and did not present heteroscedasticity (Table 5, 6, 7), and the model chosen was the following:  $\text{rentabilidad} = -3404.79 + 19.09 \text{ prod} + 48.67 \text{ supseme} - 13.67 \text{ supm} - 13.71 \text{ upautoc} - 19.26 \text{ agub} - 52.38 \text{ ininsuf} - 3.32 \text{ supcom} + 1620.76 \text{ supup} - 9.35 \text{ up}$ .

Where: rentabilidad: profitability of rural enterprises by municipality (pesos); prod: agricultural production of coffee, beans, corn and wheat (t); supseme: area cultivated with improved seeds (ha), supm: corn harvested area (ha); upautoc: number of production units that allocate their production to self-consumption; agub: number of production units with income derived from government

support; ininsuf: number of productive units with insufficient infrastructure for production (machinery, fertilizers, irrigation system); supcomun: communal area (ha); supup: area per productive unit (ha) and up: number of production units.

**Table 5. Model 1. OLS with correction for heteroscedasticity. Dependent variable: profitability.**

	Coefficient	Std. Dev.	t-statistic	P-value	
Const	-3 404.79	1 715.32	-1.985	0.0492	**
Prod	19.0974	2.18438	8.743	<0.0001	***
Supseme	48.677	8.75518	5.56	<0.0001	***
Supm	-13.6712	2.69384	-5.075	<0.0001	***
Upautoc	-13.7139	9.57416	-1.432	0.1544	
Agub	-19.2687	10.0171	-1.924	0.0565	*
Ininsuf	-52.3869	22.0425	-2.377	0.0189	**
Supcomun	-3.32935	0.722753	-4.606	<0.0001	***
Supup	1 620.76	551.408	2.939	0.0039	***
Up	-9.35254	2.59588	-3.603	0.0004	***

**Table 6. Statistics based on weighted data.**

Sum of squared residuals	584.0454	S.D. of regression	2.087714
R-squared	0.909863	Adjusted R-squared	0.903809
F (9, 134)	150.2912	P-value (of F)	1.63e-65
Log-likelihood	-305.1391	Akaike criterion	630.2781
Schwarz criterion	659.9762	Hannan-Quinn criterion	642.3458

**Table 7. Statistics based on the original data.**

Mean of the dep. var.	-40.36425	SD of the dep var.	12 279.88
Sum of squared residuals	1.11e+10	SD of regression	9 086.141

For each production unit that does not have the adequate infrastructure for production, profitability decreases \$52.38. For every hectare of land that belongs to the communal tenure regime, the profitability decreases \$3.32. For each hectare that is part of the production unit, the profitability increases \$ 1 620.76. When a production unit increases in the municipalities, profitability decreases \$9.35.

## Conclusions

Rural agricultural enterprises are small in area, do not have enough technology and make little use of fertilizers. The profitability of PU ranged from -19 000 to 13 000 pesos, profitability per municipality was maximum four million and profitability per hectare was -9 000 to 6 500 pesos.

The results obtained accept the hypothesis raised in the part that rural enterprises have returns of less than \$ 15 000, but it is not accepted in the part of the factors that influence profitability, they are labor, fertilization except for the total area that does influences profitability; that is, mostly, factors related to land, self-consumption and external factors, such as government programs, influence.

It is recommended to form associations of producers that allow sharing production objectives, increasing yields and diversifying crops, so that the volume of surpluses can compete in local or regional markets and generate economic income that encourages producers to continue with agricultural practice as a work alternative and to invest in capital that enhances their production process. Although these recommendations are aimed at all municipalities, those considered consolidated and in transition have the best conditions to grow in the short term.

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